A response to Yasuo Deguchi's ‘Robustness, Reality and the Transcendental’

Knight, Kerstin

A response to Yasuo Deguchi's 'Robustness, Reality and the Transcendental'

Kerstin Knight

1. Locating the Territory of Inquiry

A good metaphysical theory should be able to make sense of science, since science accounts for a great deal of what we do, believe and survive with.

Yasuo Deguchi considers whether we can make sense of scientific activity while at the same time being committed to the existence of entities, which cannot be directly observed. His example of such an entity is the electron. He claims a realist position, which thinks of science as a rational activity only by committing to the existence of non-observable entities. This opposes the anti-realist position, which thinks one can make sense of scientific activity without committing to non-observables at all.

In his paper 'Robustness, Reality and The Transcendental', Deguchi sides with a particular form of realism: activity realism. He believes that neither anti-realists nor pragmatists[(1)] can sensibly explain 'measurement-networking', a common strategy in scientific practice, which he takes to be the hallmark of activity-realism.

Deguchi proposes that activity realism cannot only make better sense of scientific activity through committing to the existence of non-observable entities, but it can also make better sense than anti-realism of scientific practice itself.

2. The Basic Questions

In the original discussion Deguchi separated the following two main questions[(2)]:

> "Can we take scientific activity to be rational, or even to make sense, without being committed to the existence of entities that are not directly observable, such as electron?"

> "When, or under what conditions, does a commitment to the existence of entity such as electron become indispensable to the rationality, or the making sense, of scientific activity?"

In Deguchi's account it turns out that his answer to the first question relies heavily on his findings of the second. So I will begin by looking at his answers, as I understand them, in reverse order.

3. Deguchi's Answers

Deguchi believes that certain non-observable entities, e.g. the electron, reach a position so crucial for our ways of explaining of and dealing with the (scientific) world, that they acquire a status of reality that is grounded in our use of them. We don't have to directly observe these entities, the fact that our rationality would be in strife without them is enough to warrant their reality status. This he calls activity reality.

If one were to accept such 'reality by proxy' as a genuine account of reality, it is relevant to ask at what stage of scientific activity one's rationality becomes (seemingly irrevocably) committed to such an 'activity-existential' status. Deguchi considers a number of significant steps in the scientific progression towards the acceptance of non-observable entities: *successful theoretical prediction,* as suggested by Putnam et al., *success in experimentation* as proposed by Hacking(3) and finally successful networking of measurements(4), proposed by him.

Amongst these he favours *networking success*, because he thinks successful networking requires a more robust notion of the non-observable entity in question, than the other two contenders would deliver. Only such a robust notion can ground our belief that the entity is essential to our rationality and thereby give it activity reality status.

Deguchi thinks the activity reality gained from successful networking of measurements is more significant than the sense of reality gained from the other two stages of scientific development, because the large (sometimes even contradictory) range of theories feeding into the network, prevents or at least minimizes the possibility of a systematic error.

He thinks successful prediction of experimental outcome and successful application of a single theory collapse into the same (just temporally displaced) phenomenon, because they are based on the same theory. Successful experimentation may at best aim at minimizing a stochastic error by a high number of experimental repeats. A systematic error about the existence of the non-observable entity however, cannot be excluded, exactly because all the experiment predictions or executions are based on the same background theory (concerning equipment, experimental settings and/or other factors), which acts as bias. Such bias can only be overcome by a variety of methods. Method variety is only found at the networking stage, hence, the wider the range of different methods (and therefore their background theories pointing to the non-observable entity) says Deguchi, the more able we are to conclude that theory bias is negligible.

These insights are extrapolated directly from the basic principles of statistics. They are standard practice in science and Deguchi employs the methods of statistical representation to represent the phenomenon of robustness. First experimental data are gained in different fields with different methods and plotted as a line of best fit in a graph of the least square method (figure 1). As new data are generated with new methods and theories, these values can be adjusted by a least square adjustment (figure 2)(

Figure 1

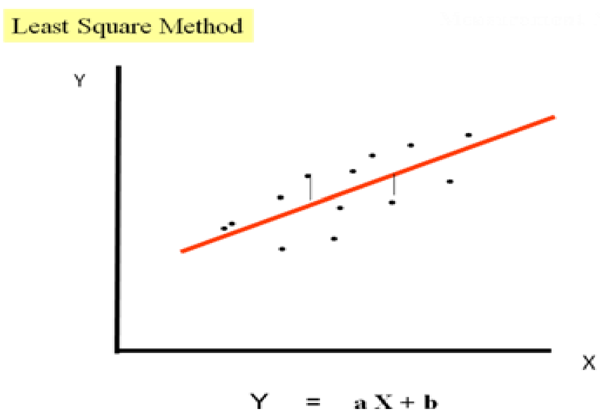
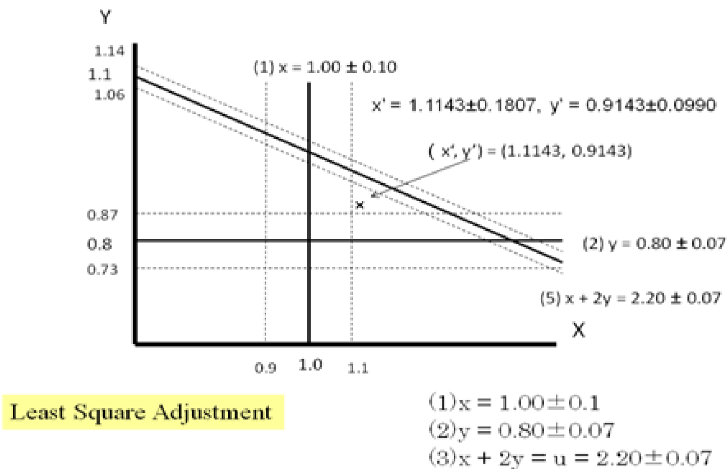


Figure 2



Thus the least square adjusted value for the non-observable entity is not actually a datum derived in any experimentation directly. It is a statistically calculated entity, which lies in the vicinity of all of the derived values. It is dynamic as it changes with new scientific insight and it is meant to be as close as we can currently get to the un-observable external reality.

As far as I understand Deguchi, the robustness of data gained from networking is of two fold importance:

1 - Functionally it cements our confidence about the existence of the non-observable entity per se.

2 - It makes the entity most indispensable to our rationality and thereby gives it a status of activity reality, the denial of which would call our rationality into question.

Having thus defended the essential nature of measurement-networking, Deguchi's final step in the argument against ant-realism is the claim that anti-realism cannot give a rational explanation for theory net-working.

Since measurement networking is common practice in science, and anti-realism supposedly cannot explain why it would be good to network in the first place, anti-realism fails to make sense of science in a significant way.

Furthermore, since our rationality would be called into question without taking non-observables as (activity) real, and (activity) reality in a robust sense is only gained through networking (which anti-realism supposedly cannot explain) anti-realism fails as a meta-physical position.

4. My Concerns

a) Robustness

Since the notion of robustness is a critical point in Deguchi's account, I think it warrants some critical appreciation.

Are networked data really more robust? I wonder about this, especially when the theories incorporated in the network have no further compatibility restraint as to the incorporation of direct contradictions?

In order to clarify my concerns I devised a little thought experiment concerning a non observable entity, called 'Atlantis'. Let's imagine that our desired scientific practice aims at finding out where Atlantis (a non-observable entity) was. For this we may employ many theories and methods. They all employ some notion of 'location'. Some theories specify location to mean a physical spot, some may not and some may explicitly include virtual locations, such as a web-site, as legitimate location.[6] We proceed to network all our theories irrespective of possible contradictions lurking in their assumed theory of location.

Imagine next that our scientific investigators isolate two locations, which are **equally** credible (or one might say robust) as having been Atlantis, except that one is a virtual location and the other is a physical location.

What can be observed at this stage?

1 - The network arrives at an impasse. The investigators cannot decide from **within** the networking framework which location to pick as the 'real' one (or most likely one). How may they progress?

They can either alter the network to exclude contradicting theories of location or they must find another way to discount one location within the networking-framework constraints. The latter really comes down to a version of the former, since we postulated equal credibility at the beginning. Even if potential contradictions are allowed to remain within the network, some other networking-framework parameters will have to be altered in such a way that that one result can be eliminated. Note that such framework alteration is only prompted by the findings of the investigation and not by whatever prompted the network framework in the first place. Hence it cannot really be said that the networking framework was determined by 'external reality' as such.

The only other alternative to framework adjustments is to accept the impasse and remain non-committal about the results. This however, is not really progress and in some practical applications may be unacceptable.

2 - It seems to me that the distinct possibility of indeterminacy casts a shadow of doubt on the idea of robustness. The networked theories fail to give a robust account precisely because they are so varied in nature. Theory variety (at least straight contradiction), the supposed savior from systematic error, causes the problem: we cannot find the answer we are seeking, because our network is too permissive in order to generate anything robust. The indeterminacy of our result casts doubt on the entire structure. In cases of non-observable entities we may then be left to wonder, whether they exist (or not) or whether we simply got the networking wrong? If we cannot find something, it can be either because we haven't looked in the right place (or the right way), or because it doesn't exist.

We might think that the point about robustness could be amended in ways which invite variety, but do not permit contradictions. This will be difficult, in practice at least. Firstly, because we often don't see contradictions lurking in the background, as many pre-suppositions hide from view, and secondly, because science would have to face quite a significant revision of current practice, as it already unites many theories with contradicting presuppositions in many frameworks.(7)

3 - Our networking framework dictates what we can accept as reality in the first place. If in my example the framework precluded virtual locations from being the kind of reality, which we would find credible, then Atlantis could not ever be a virtual location. This is trivially true.

Our networking frameworks are social scientific constructs. Looking at a line of *best fit* from an adverse perspective could also be called a line of *no fit, since* none of the points actually lie on it. The difference in perspectives is explained by the kind of fit or error margin one finds acceptable. An error margin is not determined from within the framework, it is determined in social scientific context by something else and one would be hard pressed to trace this 'something else' back to rationality.

Whatever determines the error margin is itself subject to error margins, and so on. Deguchi agrees with this point. The decision about an acceptable error margin and/or methodology, at some stage is what he calls a *super-rational*(8) choice, something that transcends statistic methodology.

b) independent reality

Deguchi's ideas of robustness are extrapolated from basic principles of statistics. These concern how one may overcome 2 types of errors, stochastic and systematic error. This is consistent with scientific practice, but it overlooks or assumes that we agree on some foundation assumptions, which every statistician makes. This we may not.

In using the 'principle of triangle agreement' as a correction principle for systematic errors, every statistician and scientist assumes the existence of an *independent* external reality. To quote Deguchi on this: "The reality implied in this assumption is not constructed by, nor dependent on any of the heterogeneous measurement methods (*or their background theories*(9)) rather it is neutral to, and independent of them. If the object of each measurement is taken as an independent reality, then it is natural and rational to suppose two measurement results that correspond to it also agree with each other".

For scientific and practical purposes it is perfectly reasonable to agree with these assumptions.

However, in a discussion about metaphysics (or meta-science), a presupposition of an '*independent* external reality' seems to be question-beggingly inappropriate. The independence of external reality is at yet another example of a non-observable entity, which one has to accept by 'super-rational' choice.

There are two points here:

Firstly, choosing to accept the principles of statistics is not a rational, but a super-rational decision. This shows that our activities are more guided by pragmatism than rationality, which somewhat diminishes the significance of rationality in scientific practice.

Deguchi, who thinks activity-realism is essential for our claims towards rationality, accepts super-rational decisions (i.e. decisions of not justifiable from within the rationality framework) at a different level of scientific practice. Why should we have different rationality requirements at different levels of scientific practice for different non-observable entities? Why not explain everything from parameters of usefulness only? Why the extra claim towards reality for electrons but not for the *independence* of reality?

Secondly, the legitimacy (rationality) of presuming such independence is doubtful, because, as I suggested above, any networking-framework, which itself must be based on a theory-framework(10) (in order to keep it workable), pre-determines reality in such a way that our "heterogeneous measurement methods" **cannot** be independent from the reality in question.(11) Not keeping networking framework within limits would result in shifting the 'reality-goal posts' during the game and keeping to framework limits, limits the possible results.

Rather than seeing reality as independent from the heterogeneous measurement methods, I think it would be more rational to see the two as co-dependent on each other.

c) pragmatics

Deguchi claims that the basic statistical assumptions are old and well established. This may be so. They may even be so old that they have a Latin phrase: "consenti a uni tertio consentiunt inter se" and that Kant referred to it in his first critique B848(12), but longevity of a principle is not a very good defense in metaphysics, unless one wants to make a point about its usefulness or its historical prominence.

One may say that the assumptions of an *independent* external reality have lead to practical success and progress in science. True, but this also is a poor defense against the anti-realist. Usefulness is metaphysically non-committal.

Pragmatism simply states, that if one accepts external reality assumptions 'super-rationally', one will be rewarded in a pleasing way as shown by science. It says nothing about what one ought to think or do in cases of failure. (Neither does Deguchi)

Contrary to Deguchi, I think most of his account is better described as scientific pragmatism - the circumstance that our super-rational choices have furnished us with some pleasing successes, despite their contradictions.

d) Anti-realism versus Activity-realism

In the following passage Deguchi characterises, what he takes to be the anti-realist position:

> It [anti-realism] claims that the networking can be explained in terms of pragmatism without appealing to realism. It is useful for science, technology and industry to have a standard value through the networking. That's why scientists are inclined to choose the 'cheapest' way to attain their goal, it claims. Also scientists are inclined to adjust only the network; e.g. to abandon one of the 'problematic' measurement results. On the other hand it costs much for them to change any basic parts of scientific knowledge. *That's why they cast no doubt on any background theory or metaphysical idea even if the networking goes wrong.* (13)

Deguchi thinks such an account is insufficient and irrational, because it fails to give a rational explanation for theory networking. Networking is cumbersome, costly and gives poorer data than any single theory would produce. "So why not simply adopt the best pre-networking value as standard value?" (14) he asks.

I think, the answer to this can be provided, without referring to realism: networking provides other gains than mere data. It can be seen as something else than inching one's way closer to the ever elusive independent reality. Networking is first and foremost a *tool* for communication. One must not forget that the data are only useful in application. Why else would one be interested in the existence of the electron? If one derives data, which are meaningful to many disciplines, because they include theories from many disciplines, it means these disciplines can communicate with one another.

Going back to my earlier example, it may be imagined, that a historian, a computer programmer and an archaeologist may fruitfully communicate about Atlantis when the framework is permissive and the data are coarse. The more precise they get the less they will have in common with respect to a theory of location, unless certain restrictions are put in place. Precision and reality are not all that is to be gained from networking. In fact, I'm not even sure that it would be rational to accept that either is gained from networking unless one is a realist by super-rational choice.

5. Summary of Conclusions

Firstly, I am claiming that Deguchi's move towards activity-realism suffers from two weaknesses.

a) It employs different standards of validation for different non-observables.

The independence of reality, a non-observable entity, is accepted on super-rational grounds, i.e. on pragmatic principles alone, yet the activity reality of electrons, another non-observable entity, is supposed to need more than pragmatic validation; its rationality is supposed to be grounded in reality. Since Deguchi's robustness account relies directly on the independent reality assumptions of statistics, it seems implausible that the two should have to adhere to different metaphysics.

b) Even if one did not object to the *independent* external reality point above, it is not clear to me that the inclusion of theories, which incorporate direct contradictions should be viewed as increasing robustness, since contradictions have a tendency to upset a framework through possibilities of indeterminacy.

This point may be remedied by an account , which has more detail about what it means for a network to fail.

Secondly, insisting that activity realism is superior to anti-realism or pragmatism in explaining the rationality of networking is not warranted, because such insistence has a too narrow appreciation of the benefits gained from networking. If one includes cross-disciplinary communication and application in one's appreciation of the networking benefit, the loss of precision in measurement and the increased costs may be quite justified and rationally acceptable.

Notes

(1) I do not wish to attempt a formal definition of anti-realism, pragmatism or realism in this paper. For the purpose of this discussion I shall take the following rough divide in metaphysical commitment: Anti-realists deny to the existence of non-observable entities; pragmatists make no metaphysical commitment, for them all that matters is whether something works; realists do commit to the existence of non-observable entities.

(2) Quoted from Yasuo Deguchi's (unpublished) presentation given at Melbourne University in August 2009; it, was this presentation, which started our discussion.

(3) References to Putnam et.al and Hacking were given in Deguchi's original presentation at Melbourne University. I

have taken them on face value without pursuing their origin.
(4) I note here that Deguchi talks about measurements. But since all measurements are based on some theory, I propose that one could equally well talk about theory-networking. However, for this discussion I will continue to use the term measurement networking as this is the term used in the original discussion.
(5) Figures 1 and 2 are given as they appear in Deguchi's original presentation at Melbourne University. Although the axes are not labelled, I presume that they relate to values of electron charge.
(6) My original description of the experiment was more detailed in a slightly different way, but I think this briefer version will suffice to make the points I wish to make.
(7) An example was given in Deguchi's original presentation at Melbourne Uni where he said:
"Measurement of a physical constant is not an isolated activity, but a holistic activity on the web of networking. An international organization, CODATA, regularly makes the least square adjustments and publishes their results with standard values of physical constants. This measurement networking is a basis for many scientific, technological and industrial activities. There are many theories that are pre-supposed by this measurement networking. Some of them are inconsistent indeed.
The first least square adjustment in 1947 [networked]:

$$\frac{2\pi me^4}{h^3c} = R_\infty (= 109737.3)$$ ....Bohr's early quantum theory (1913)

$$\frac{h}{\sqrt{em}} = 1.00084 \times 10^{-8}$$ ....De Broglie's wave theory (1923).

According to Deguchi, these two theories contradict each other theoretically and empirically. I take this information on face value.
(8) …and which I think would be better called *extra-rational* choice. In view of my argument given below, one might also call it pragmatic choice. The difference is, that an extra-rational choice is independent from knowledge of consequences, whereas pragmatism focuses on (desirable) consequences.
(9) My emphasis.
(10) E.g.: a certain metaphysical theory.
(11) They are linked at least at the basic metaphysical account, but often through other framework parameters as well.
(12) Deguchi,, 'Robustness, Reality and The Transcendental', 2009.
(13) Deguchi, ibid; - Italics in the last sentence are my emphasis, because it acknowledges and connects to some criticisms made earlier in the discussion.
(14) Ibid.

References

Deguchi, Y. (2009), 'Robustness, Reality and the Transcendental', in this current edition of *Prospectus*.
_______. (2009). 'When did the electron come into existence?', unpublished oral presentation at Melbourne University, August 3rd 2009.

[Dr. Kerstin Knight is currently a Ph.D candidate at Melbourne University,
Centre for Applied Philosophy and Public Ethics
k.knight1@pgrad.unimelb.edu.au]